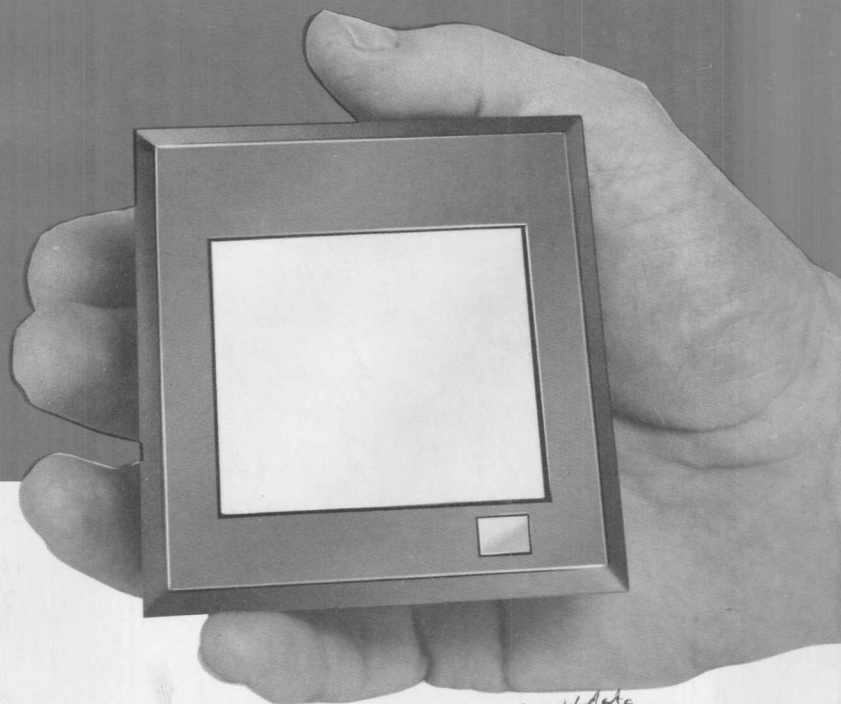


INSTRUCTION AND INTERFACE MANUAL



for

*ref 10/00 data
05/01/9*

BRAEMAR

CM-600 MINI-DEK[®]

DIGITAL MINI CASSETTE TRANSPORT

TABLE OF CONTENTS

- 1.0. Introduction
- 2.0. Specifications
- 3.0. Mechanical Configuration
- 4.0. Block Diagram
- 5.0. Summary of I/O Signals
- 6.0. Timing Diagrams
- 7.0. Detailed Description of I/O Signals
- 8.0. Precautions
- 9.0. Maintenance
- 10.0. Schematic Diagram

1.0.) INTRODUCTION

This is a little book for a little transport. The CM-600 MINI-DEK Digital Mini Cassette Tape Transport is one of the most economical means of accurate non-volatile data storage. Its small size, low power consumption and simplicity make it fit well in the architecture of today's ultra compact data systems. It is designed with the microprocessor in mind.

FUNCTIONAL

Media	: Certified Digital Mini Cassette
Number of Heads	: One
Tracks on Tape	: Two
Channels in Head	: One
Operating Modes	: Read/Write Forward, Search Forward, Rewind
Motor Drive Transport	: Reel to Reel Drive with constant reel speed (Varying Tape Speed)

PERFORMANCE

Read/Write Speed	: 3 IPS (BOT) (Consult Factory for Alternate Speeds)
Read/Write Time	: 5 Min 40 Sec 100 FT Cassette
Start Time, Read/Write	: 150 MS
Stop Time, Read/Write	: 150 MS
Start Distance, Read/Write	: .19 to .3 Inch
Stop Distance, Read/Write	: .21 to .35 Inch
Search Forward Speed	: 5 IPS Average
Search Forward Time	: 4 Min. 100 FT Cassette
Rewind Speed	: 15 IPS
Rewind Time	: 90 Sec 100 FT Cassette
Hub Speed (no load)	: $\pm 2\%$
Jitter	: $\pm 5\%$

PHYSICAL AND ENVIRONMENTAL

Dimensions	: 3" x 3" x 2.5" (HWD)
Bezel	: 3.5" x 3.5"
Weight	: Less Than 1/2 lb.
Operating Position	: Horizontal to Vertical
Operating Temperature	: 50°F to 113°F (Media Limits)
Storage Temperature	: -40°F to +160°F
Operating Relative Humidity	: 20% to 80% (Media Limits)
Storage Relative Humidity	: 0% to 90% Non Condensing

ELECTRICAL

Supply Voltage	: +5 VDC (+0.5, -0 VDC)
Supply Current	: 200 MA Max in Read/Write, 700 MA in Rewind
Power Consumption	: 1 Watt in Read/Write

DATA HANDLING

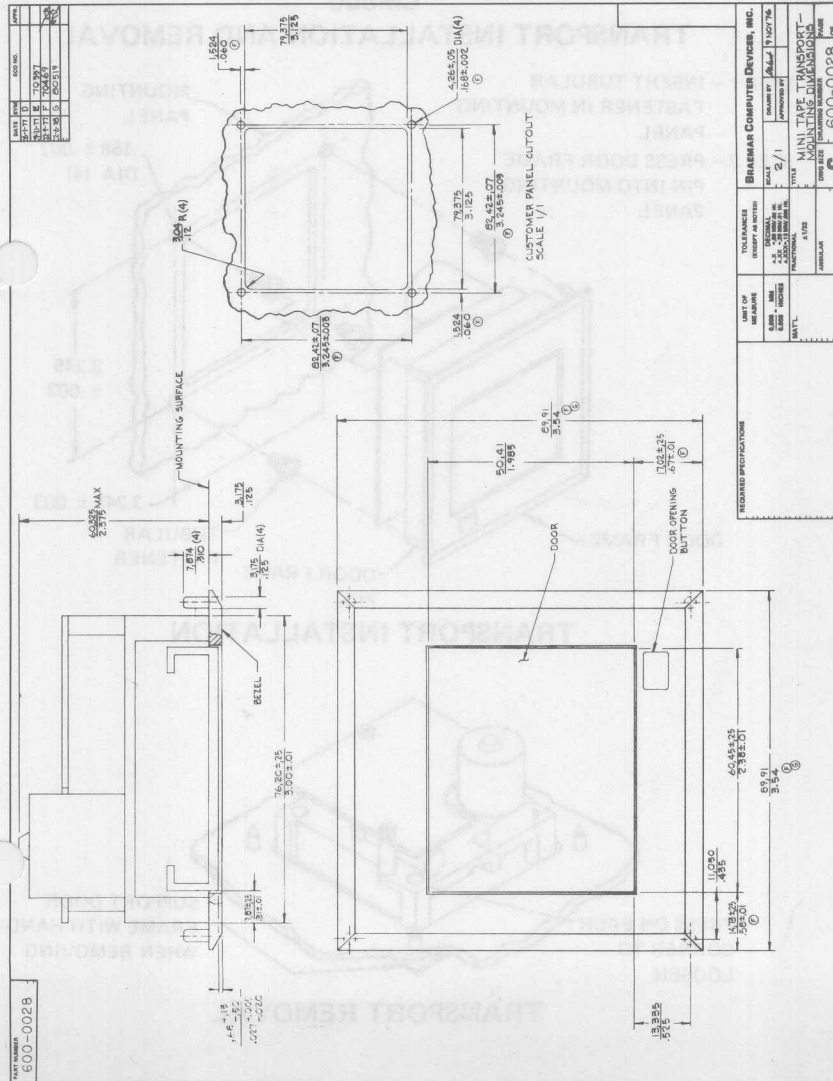
Density	: 800 BPI Max
Data Rate	: 2400 Baud
Data Capacity (both sides)	: 1.6M Bits or 200K 8 Bit Bytes (100 FT Tape)

INPUT/OUTPUT

TTL Levels	
Go/Stop	
Fast/Slow	
Forward/Reverse	
Select Read/Write	
Write Data Input	
Read Data Output	
End of Tape Sensor	
Cassette Presence	
Cassette Side Sensor) Options
File Protect	

ALL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DATE	SYM	ECO NO.	APPR.
6-1-77	0		
8-1-77	E	70327	
2-2-77	F	70469	
2-6-78	G	80519	

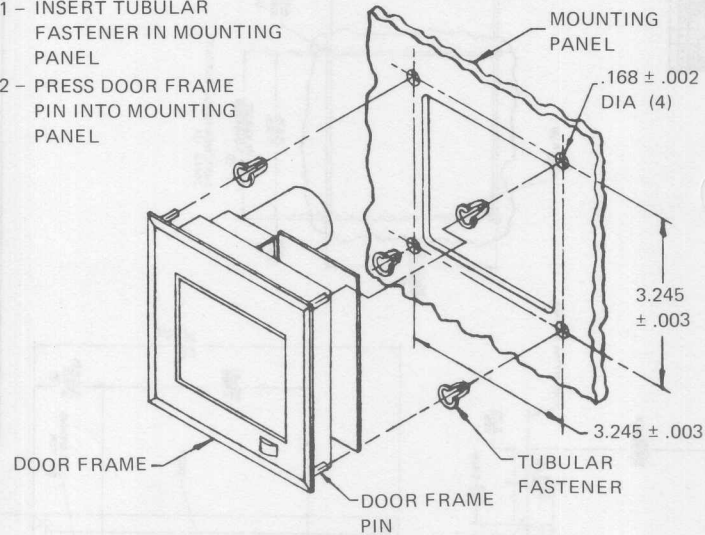


CM600

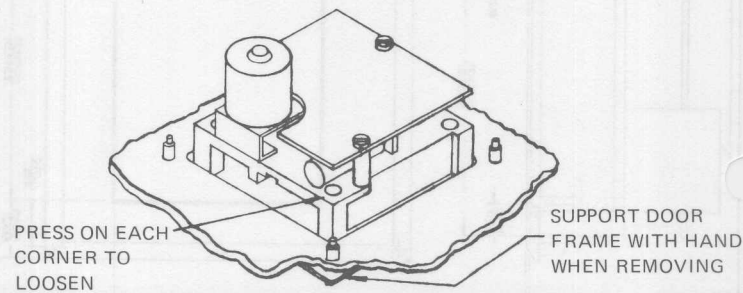
TRANSPORT INSTALLATION AND REMOVAL

STEP 1 - INSERT TUBULAR FASTENER IN MOUNTING PANEL

STEP 2 - PRESS DOOR FRAME PIN INTO MOUNTING PANEL

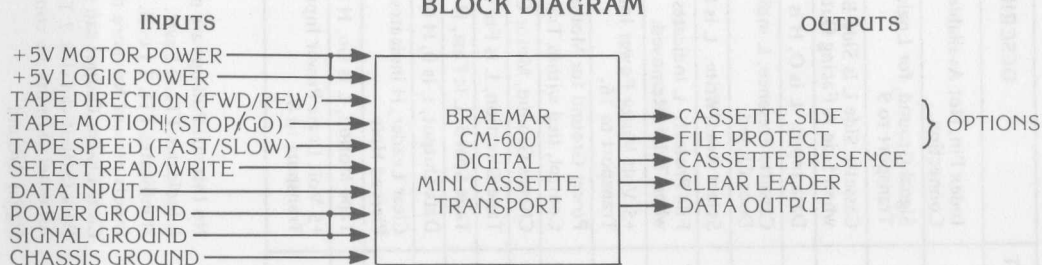


TRANSPORT INSTALLATION



TRANSPORT REMOVAL

4.0) BLOCK DIAGRAM



5.0) SUMMARY OF I/O SIGNALS

PIN NO	INPUT	OUTPUT	DESCRIPTION
1			Index Pin, Not Available for Electrical Connection.
2			Signal Ground, for Logic, tied within Transport to 9
3		X	Cassette Side L is Side B Facing Out, Open when Side A Facing Out.
4	X		Data Input. L is 0, H is 1. (Typ)
5		X	Cassette Presence, L indicates Presence and Door Closed.
6	X		Select Read/Write. L is Read, H is Write.
7		X	File Protect. L indicates Tab Present, Open when Tab is Removed.
8	X		+5 Volt Motor Power Input, tied within Transport to 16.
9			Power Ground for Motors and Motor Control, tied within Transport to 2.
10			Chassis Ground, Motor Case and Shield.
11	X		Tape Direction, L is Forward, H is Rewind
12	X		Tape Speed, L is Fast, H is Slow.
13		X	Data Output, L is 0, H is 1. (Typ)
14		X	Clear Leader, H indicates Clear Leader or Pierced Hole.
15	X		Tape Motion, L is Go, H is Stop.
16	X		+5 Volt Logic Power Input tied within Transport to 8.

No Internal Pull-ups are provided.

L indicates TTL 0 Level. (0 Volts)

H indicates TTL 1 Level. (+5 Volts)

Inputs present No more than 1 TTL load.

Clear Leader Output can sink 1 TTL load.

Data Output can sink 2 TTL loads.

All other Outputs are contact closures to Signal Ground.

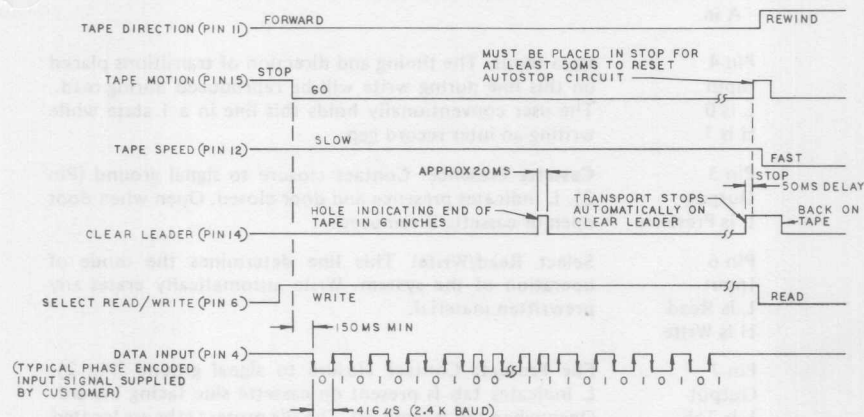
Note:

Logic and Motor power (Pins 16 & 8) are tied within the transport. They are normally supplied from the same source. In the event separate sources are desired, the jumper on the board may be cut and separate sources may be used. If the jumper between power and signal ground (Pins 2 & 9) is cut, the customer must tie these ground lines together in the host system.

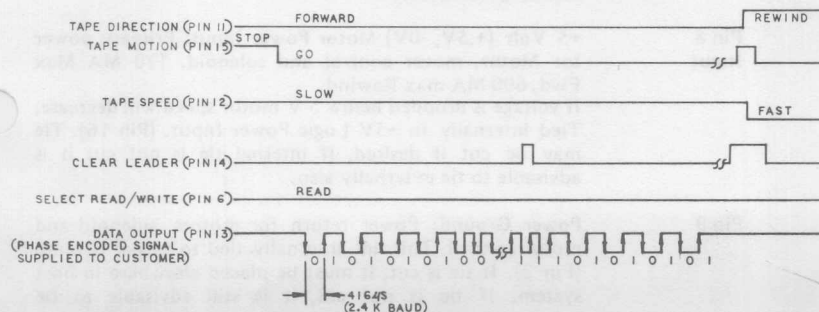
6.0) TIMING DIAGRAMS

**CM-600 DIGITAL
MINI CASSETTE TRANSPORT**

TYPICAL WRITE SEQUENCE



**READ SEQUENCE CORRESPONDING
TO THE ABOVE WRITE SEQUENCE**



7.0.) DETAILED DESCRIPTION OF I/O SIGNALS

Pin 1	Index Pin: Not available for electrical connection.
Pin 2	Signal Ground: Return path for logic and Read-Write amplifiers. This line is internally tied to Power Ground (Pin 9). If tie is cut, it must be placed elsewhere in host system. If tie is not cut, it is still advisable to tie power and signal ground externally.
Pin 3 Output L is Side A in	Cassette Side: Contact closure to signal ground (Pin 2). L is Side A facing in. Open when side B facing in. The active track is the track which faces in.
Pin 4 Input L is 0 H is 1	Data Input: The timing and direction of transitions placed on this line during write will be reproduced during read.. The user conventionally holds this line in a 1 state while writing an inter record gap.
Pin 5 Output L is Presence	Cassette Presence: Contact closure to signal ground (Pin 2). L indicates presence and door closed. Open when door open or cassette is removed.
Pin 6 Input L is Read H is Write	Select Read/Write: This line determines the mode of operation of the system. Write automatically erases any prewritten material.
Pin 7 Output L is Tab Present	File Protect: Contact closure to signal ground (Pin 2). L indicates tab is present on cassette side facing inward. Open when tab is removed. The file protect tabs are located at the rear center of the cassette. They are removed with a sharp pointed object.
Pin 8 Input	+5 Volt (+.5V, -0V) Motor Power Input: Primary power to: Motor, motor control and solenoid. 170 MA Max Fwd, 600 MA max Rewind. If voltage is dropped below 5 V motor speed will decrease. Tied internally to +5V Logic Power Input. (Pin 16). Tie may be cut if desired. If internal tie is not cut it is advisable to tie externally also.
Pin 9	Power Ground: Power return for motors, solenoid and motor control. This line internally tied to Signal Ground (Pin 2). If tie is cut, it must be placed elsewhere in host system. If tie is not cut, it is still advisable to tie power and signal ground externally.

Pin 10	Chassis Ground Motor case and shield. Isolated from all other grounds. User should tie this point to hose system chassis.
Pin 11 Input L is Forward H is Rewind	Tape Direction: This line should not change state when a motion command is present. If a rapid change of direction is required, a stop command should be given at least 1 us prior to issuing a new direction command.
Pin 12 Input L is Fast H is Slow	Tape Speed: In the fast mode the speed regulator is bypassed and the motor is supplied directly from the +5 motor power line. If a higher fast speed is required, consult the factory regarding 12 volt operation.
Pin 13 L is 0 H is 1	Data Output: This line reproduces the data as it was written. A sequence written as a transition to High followed 300 us later by a transition to Low will be reproduced accordingly. The frequency at this output must be between 1 KHZ and 2.5 KHZ. This output is designed to reproduce phase encoded data written at 2.4 K baud, It is capable of driving two TTL loads.
Pin 14 Output L is Presence of Tape H is Clear Leader	Clear Leader: H indicates clear leader or the pierced hole preceding the clear leader. L indicates the presence of opaque tape. This is a special CMOS output which has the capability of sinking one TTL input <i>only</i> . This output will always recognize the hole in slow speed forward. It cannot be guaranteed to recognize the hole in fast speed or in rewind.
Pin 15 Input L is Go H is Stop	Tape Motion: A clear leader indication automatically overrides a Go signal and Stops the transport. To re-start the transport at end of tape, place the transport in stop (high) for 50 MS and then give a Go command (low). (The direction command should be changed during the 50 MS period or the transport will re-start in the same direction and run until it hits the hub.) The automatic stop circuit will be disabled for 10 seconds after the Go command is given. This will enable the transport to get off the clear leader and back onto tape. The transport will stop automatically on clear leader only. It will not stop on the pierced hole which precedes the clear leader by 6 inches.
Pin 16 Input	+5 Volt (+.5V, -0V) Logic Power Input: Supply line for logic and read/write amplifiers. 30 MA tied internally to +5 Motor Power Input. (Pin 8) Tie may be cut if desired. If internal tie is not cut, it is advisable to tie externally also.

8.0.) PRECAUTIONS

- 8.1. **Inputs:** Some of the inputs are CMOS inputs. They have the standard input protection diodes provided with recent CMOS logic devices. They are however, not immune to static destruction or damage which may later result in failure. For this reason care must be taken when installing and removing the unit. For maximum protection, place shorting foam under the I/O connector when removing, installing or shipping the unit. Never leave an input open when the unit is under power and never remove or install the unit under power.
- 8.2. **Outputs:** The clear leader output (Pin 14) is a 74C02 and may be shorted to either +5 or ground. The data output line (Pin 13) is a 4049 and should *not* be shorted. This should be particularly noted where the transport is powered up before the host system and there is a possibility of the host loading the data output (Pin 14).
- 8.3. **Grounds:** Always verify that all grounds are properly connected prior to applying signals or power to the transport. This will avoid back biasing of inputs. To power down, disconnect the power lead. Never open a ground.
- 8.4. **Mechanical Considerations:** Be very careful to avoid oil films on the drive surfaces. If oil contaminates them (either through handling or accident) they should be cleaned with alcohol.
- 8.5. **I/O Cable:** The I/O connector and the corresponding signals in this manual are numbered as per conventional I/C designation. Pin 1 is the index pin and it is blocked. If the customer elects to use a flat cable as an interconnect cable it should be noted that the wires do not normally appear in numerical order, (e.g. the wire corresponding to pin 14 may be located between the wires corresponding to pins 2 and 3.) The customer should check his particular configuration prior to applying power.
- 8.6. **Initial Conditions:** When the unit is powered up or returned to the read mode, the state of the data output is undefined. This means that the first data transition of the first record might be missed. If initial transitions are required, the unit may be modified as per the dotted line on the schematic.
- 8.7. **Abuse of Rubber Surfaces:** An interlock is provided to stop the unit at end of tape. This can be over-ridden for short periods of time, and caution is necessary in operation. Do not skid the puck at beginning or end of tape.

9.0.) MAINTENANCE

Little maintenance is required. The customer should clean the head with alcohol as needed. This is determined by observation. No lubrication should ever be added to any of the shafts or bearings. The only other maintenance advisable (besides general dust removal) is the possible cleaning of the drive surfaces should they become oily. (see "Precautions" in section 8). In general, your CM600 Mini-Dek should give trouble free operation for extended periods of time with minimal maintenance.

